

What is Claimed is:

1. A method for managing a defective area on a recording medium of writable once type, the recording medium including a data area, the method comprising:

(a) detecting an existence of a defective area within the data area of the recording medium once data are written onto the data area in a data writing operation;

(b) writing data written in the defective area onto another area of the data area if the defective area is detected; and

(c) writing, onto at least one defect management area on the recording medium, defect management information associated with the defective area.

2. The method as claimed in claim 1, further comprising:

(d) writing clusters of data onto a first recording area of the data area during a first data writing operation, each cluster of data being written to one of a plurality of cluster areas of the first recording area; and

wherein the detecting step (a) includes:

for each of the cluster areas, examining data written therein and determining whether the corresponding cluster area is defective based on the examination result.

3. The method as claimed in claim 2, wherein the writing step (b) includes:

writing data written on a corresponding cluster area of the first recording area, onto another cluster area of the data area, if the determining step determines that the corresponding cluster area is defective.

4. The method as claimed in claim 3, wherein the writing step (c) includes:

after the writing step (b) is completed for the first data writing operation, writing defect management information associated with all the

defective cluster areas of the first recording area, onto the at least one defect management area on the recording medium.

5. The method as claimed in claim 1, wherein in the writing step (c), the defect management information includes a plurality of defect lists, each of the defect lists associated with one of a plurality of recording areas of the data area.

6. The method as claimed in claim 5, wherein the defect lists are written scattered throughout the data area according to data writing operations.

7. The method as claimed in claim 6, wherein the recording medium includes a pre-assigned spare area within the data area.

8. The method as claimed in claim 7, wherein in the writing step (b), the another area of the data area is the pre-assigned spare area.

9. The method as claimed in claim 6, wherein each of the defect lists contains a present defect list and any previous defect list, such that each of the defect lists becomes a cumulative defect list.

10. The method as claimed in claim 1, wherein in the writing step (c), the at least one defect management area on the recording medium is part of a pre-assigned spare area within the data area of the recording medium.

11. The method as claimed in claim 10, wherein the pre-assigned spare area is either an inner spare area located at a front part of the data area, or an outer spare area located at a rear end of the data area.

12. The method as claimed in claim 10, wherein in the writing step (b), the another area of the data area is part of the pre-assigned spare area.

13. The method as claimed in claim 10, wherein in the writing step (c), the defect management information includes a plurality of defect lists, each of the defect lists associated with one of a plurality of recording areas of the data area, and wherein each of the defect lists contains a present defect list and any previous defect list such that each of the defect lists becomes a cumulative defect list.

14. The method as claimed in claim 1, wherein in the writing step (c), the at least one defect management area on the recording medium is an area outside of the data area on the recording medium.

15. The method as claimed in claim 1, wherein the defect management information includes positional information on the defective area and positional information on the another area of the data area used in the writing step (b).

16. The method as claimed in claim 1, further comprising:
(e) writing disc definition structure information onto a lead-in area of the recording medium, the disc definition structure information containing positional information associated with the defect management information.

17. The method as claimed in claim 1, wherein the recording medium is a Blu-ray Disc Write Once (BD-WO).

18. A method for managing a defective area on a recording medium of writable once type, the recording medium including a data area and a lead-in area, the data area including a spare area, the method comprising:

(a) detecting an existence of a defective area within the data area of the recording medium after writing data onto the data area in a data writing operation;
(b) writing data written in the defective area onto the spare area if the defective area is detected; and

(c) writing, onto the lead-in area, defect list information associated with the defective area.

19. The method as claimed in claim 18, wherein the recording medium is a Blu-ray Disc Write Once (BD-WO).

20. The method as claimed in claim 18, wherein in the writing step (c), the defect list information includes a plurality of defect lists each associated with one of a plurality of recording areas of the data area, and each of the defect lists contains a present defect list and any previous defect list such that each of the defect lists becomes a cumulative defect list.

21. A recording medium of writable once type, comprising:
a data area including a recording area, a replacement area, and at least one defect management area,

wherein an existence of a defective area within the data area of the recording medium is detected after data are written onto the recording area during a data writing operation,

data written in the defective area are written onto the replacement area if the defective area is detected, and

defect management information associated with the defective area is written onto the at least one defect management area.

22. The recording medium as claimed in claim 21, wherein the recording area includes a plurality of cluster areas,

wherein clusters of data are written onto the recording area during a first data writing operation, each cluster of data being written to one of the cluster areas of the recording area, and

for each of the cluster areas, data written therein is examined to determine whether the corresponding cluster area is defective.

23. The recording medium as claimed in claim 22, wherein data written on a corresponding cluster area of the recording area, is written onto

another cluster area of the data area, if the corresponding cluster area is determined to be defective.

24. The recording medium as claimed in claim 23, wherein defect management information associated with all the defective cluster areas of the recording area is written onto the at least one defect management area on the recording medium.

25. The recording medium as claimed in claim 21, wherein the defect management information includes a plurality of defect lists, each of the defect lists associated with one of a plurality of recording areas of the data area.

26. The recording medium as claimed in claim 25, wherein the defect lists are written scattered throughout the data area according to data writing operations.

27. The recording medium as claimed in claim 26, wherein the recording medium further includes a pre-assigned spare area within the data area.

28. The recording medium as claimed in claim 27, wherein the replacement area of the data area is the pre-assigned spare area.

29. The recording medium as claimed in claim 26, wherein each of the defect lists contains a present defect list and any previous defect list, such that each of the defect lists becomes a cumulative defect list.

30. The recording medium as claimed in claim 21, wherein the at least one defect management area on the recording medium is part of a pre-assigned spare area within the data area of the recording medium.

31. The recording medium as claimed in claim 30, wherein the pre-assigned spare area is either an inner spare area located at a front part of the data area, or an outer spare area located at a rear end of the data area.

32. The recording medium as claimed in claim 30, wherein the replacement area of the data area is part of the pre-assigned spare area.

33. The recording medium as claimed in claim 30, wherein the defect management information includes a plurality of defect lists, each of the defect lists associated with one of a plurality of recording areas of the data area, and wherein each of the defect lists contains a present defect list and any previous defect list such that each of the defect lists becomes a cumulative defect list.

34. The recording medium as claimed in claim 21, wherein the at least one defect management area on the recording medium is an area outside of the data area on the recording medium.

35. The recording medium as claimed in claim 21, wherein the defect management information includes positional information on the defective area and positional information on the replacement area of the data area.

36. The recording medium as claimed in claim 21, further comprising:

a lead-in area located outside of the data area and carrying disc definition structure information including positional information associated with the defect management information.

37. The recording medium as claimed in claim 21, wherein the recording medium is a Blu-ray Disc Write Once (BD-WO).

38. A recording medium of writable once type, comprising:
a data area including a spare area; and

a lead-in area,

wherein an existence of a defective area within the data area of the recording medium is detected after writing data onto the data area in a data writing operation,

data written in the defective area is written onto the spare area if the defective area is detected, and

defect list information associated with the defective area is written onto the lead-in area.

39. The recording medium as claimed in claim 38, wherein the recording medium is a Blu-ray Disc Write Once (BD-WO).

40. The recording medium as claimed in claim 38, wherein the defect list information includes a plurality of defect lists each associated with one of a plurality of recording areas of the data area, and each of the defect lists contains a present defect list and any previous defect list such that each of the defect lists becomes a cumulative defect list.

41. An apparatus for managing a defective area on a recording medium of writable once type, the recording medium including a data area, the apparatus comprising:

(a) means for detecting an existence of a defective area within the data area of the recording medium once data are written onto the data area in a data writing operation;

(b) means for writing data written in the defective area onto another area of the data area if the defective area is detected; and

(c) means for writing, onto at least one defect management area on the recording medium, defect management information associated with the defective area.

42. An apparatus for managing a defective area on a recording medium of writable once type, the recording medium including a data area

and a lead-in area, the data area including a spare area, the apparatus comprising:

- (a) means for detecting an existence of a defective area within the data area of the recording medium after writing data onto the data area in a data writing operation;
- (b) means for writing data written in the defective area onto the spare area if the defective area is detected; and
- (c) means for writing, onto the lead-in area, defect list information associated with the defective area.